CLAIMS

What is claimed is:

1. A method of forming a valve assembly for delivering a fluid from a fluid bag to an animal caging system for housing an animal, the method comprising:

forming, in an injection molding machine, an upper member having a piercing member, said upper member having a fluid channel defined therethrough; and

forming, in an injection molding machine, a base having a base fluid channel defined therethrough, wherein said base is designed to be matingly coupled to said upper member.

2. The method of claim 1, further comprising:

forming, in an injection molding machine, a stem member designed and dimensioned to be disposed in part within said base fluid channel, said stem member having an actuation portion and a top portion having a lower surface.

3. The method of claim 2, further comprising:

forming, in an injection molding machine, a sealing member disposed in said base fluid channel, said sealing member having a flow aperture and a sealing member bottom surface, said sealing member being designed and dimensioned to facilitate sealing of said flow apertures when said sealing member bottom surface abuts a top surface of said stem member.

4. The method of claim 3, said forming said upper member and forming said sealing member comprising:

forming said upper member in a first step of a multi-step injection molding process; and

forming said sealing member is a second step of said multi-step injection molding process.

5. The method of claim 4, wherein said upper member becomes attached to said sealing member such that said upper member and said sealing member form a single integral piece.

6. The method of claim 1, wherein said upper member is formed of polypropylene.

7. The method of claim 3, wherein said sealing member is formed of silicone rubber.

8. The method of claim 1, further comprising:
inserting a portion of said upper member into said base, thereby causing said upper member to be friction fit to said base.

9. The method of claim 8, further comprising:
disposing a part of said stem member within said base fluid channel.

10. The method of claim 3, further comprising:
disposing a spring element within said base fluid channel;
wherein a portion of said spring element abuts said lower surface to apply a biasing force to said stem member.

11. The method of claim 10, wherein said spring element comprises at least one group of dead coils, thereby facilitating prevention of tangling of a plurality of spring members when said spring members are arranged during assembly.

12. The method of claim 10, wherein said spring element comprises three groups of dead coils, one of said groups being located at the center of said spring element, one of said groups being located at a first end of said spring element, and one of said groups being located at a second end of said spring element, thereby facilitating prevention of tangling of a plurality of spring members when said spring members are arranged during assembly.

13. The method of claim 3, wherein said sealing member bottom surface has a lower ridge extending therefrom, said lower ridge being designed and dimensioned to facilitate the concentration of said biasing force from said spring member to seal said flow aperture.

14. The method of claim 3, wherein said stem member is designed and dimensioned to selectively facilitate the flow of the fluid when said actuation portion is pushed.

15. The method of claim 3, wherein said stem member is designed and dimensioned to selectively facilitate the flow of the fluid when said actuation portion is pushed with a force of less than or equal to 5 grams.

16. The method of claim 3, wherein said stem member is designed and dimensioned to selectively facilitate the flow of the fluid when said actuation portion is pushed with a force of less than or equal to 3 grams.

17. The method of claim 1, wherein said valve assembly is disposable.

18. The method of claim 1, further comprising:
piercing a fluid bag with said piercing member to facilitate the providing of fluid from the fluid bag to an animal.

19. The method of claim 18, further comprising:
disposing of the valve assembly after the animal has consumed fluid from said fluid bag.

20. The method of claim 2, further comprising:
disposing a spring element within said base fluid channel;
wherein a portion of said spring element abuts said lower surface to apply a biasing force to said stem member.

21. The method of claim 20, wherein said spring element comprises at least one group of dead coils, thereby facilitating prevention of a tangling of a plurality of spring members when said spring members are arranged during the assembly process.

22. The method of claim 20, wherein said spring element comprises three groups of dead coils, one of said groups being located at the center of said spring element, one of said groups being located at a first end of said spring element, and one of said groups being located at a second end of said spring element, thereby facilitating prevention of tangling of a plurality of spring members when said spring members are arranged during assembly.

23. A valve assembly for delivering a fluid from a fluid bag to an animal caging system for housing an animal, the valve assembly comprising:

an upper member having a piercing member and a connecting member, said upper member having a fluid channel defined therethrough;

a base having a base fluid channel defined therethrough, wherein said base is designed to be matingly coupled to said upper member;

a stem member designed and dimensioned to be disposed in part within said base fluid channel, said stem member having an actuation portion and having a top portion having a lower surface; and

a sealing member integrally formed with said upper member and disposed in said base fluid channel, said sealing member having a flow aperture and a sealing member bottom surface, said sealing member being designed and dimensioned to facilitate sealing of said flow apertures when said sealing member bottom surface abuts a top surface of said stem member.

24. The valve assembly of claim 23, further comprising:

a spring element disposed within said base fluid channel;

wherein a portion of said spring element abuts said lower surface to apply a biasing force to said stem member.

25. The valve assembly of claim 24, wherein said spring element comprises at least one group of dead coils, thereby facilitating prevention of a tangling of a plurality of spring members when said spring members are arranged during the assembly process.

26. The valve assembly of claim 24, wherein said spring element comprises three groups of dead coils, one of said groups being located at the center of said spring element, one of said groups being located at a first end of said spring element, and one of said groups being located at a second end of said spring element.

27. The valve assembly of claim 24, wherein said sealing member bottom surface comprises a lower ridge extending therefrom, said lower ridge being designed and dimensioned to facilitate the concentration of said biasing force from said spring member to seal said flow aperture.

28. The valve assembly of claim 23, wherein said stem member is designed and dimensioned to selectively facilitate the flow of the fluid when said actuation portion is pushed.

29. The valve assembly of claim 23, wherein said stem member is designed and dimensioned to selectively facilitate the flow of the fluid when said actuation portion is pushed with a force of less than or equal to 5 grams.

30. The valve assembly of claim 23, wherein said stem member is designed and dimensioned to selectively facilitate the flow of the fluid when said actuation portion is pushed with a force of less than or equal to 3 grams.

31. The valve assembly of claim 24, wherein said stem member is designed and dimensioned to selectively facilitate the flow of the fluid when said actuation portion is pushed with a force of about 5 grams.

32. The valve assembly of claim 24, wherein said stem member is designed and dimensioned to selectively facilitate the flow of the fluid when said actuation portion is pushed with a force of about 3 grams.

33. The valve assembly of claim 23, wherein said stem member is designed and dimensioned to selectively facilitate the flow of the fluid when said actuation portion is pushed with a force of about 3 grams.

34. The valve assembly of claim 24, wherein said stem member has a length of about 0.42 inches.

35. The valve assembly of claim 34, wherein said base fluid channel has a width of about 0.205 inches.

36. The valve assembly of claim 34, wherein said top surface of said stem member has a width of about 0.200 inches.

36. The valve assembly of claim 34, wherein said spring member has an outer diameter of about 0.188 inches.

37. The valve assembly of claim 34, wherein said spring member has a load force when compressed to a length of 0.255 inches in the range of about 18.8 to 25.8 grams.

38. The valve assembly of claim 23, wherein said upper member is formed of polypropylene.

39. The valve assembly of claim 23, wherein said sealing member is formed of silicone rubber.

40. The valve assembly of claim 23, wherein said upper member is friction fit to said base.

41. The valve assembly of claim 23, wherein a part of said stem member is disposed within said base fluid channel.

42. The valve assembly of claim 23, wherein said valve assembly is disposable.

43. A valve assembly comprising:

an upper member having a piercing member and a connecting member, said upper member having a fluid channel defined therethrough;

a base having a base fluid channel defined therethrough, wherein said base is designed to be matingly coupled to said upper member;

a stem member designed and dimensioned to be disposed in part within said base fluid channel, said stem member having an actuation portion and having a top portion having a lower surface;

a sealing member integrally formed with said upper member and disposed in said base fluid channel, said sealing member having a flow aperture and a sealing member bottom surface, said sealing member being designed and dimensioned to facilitate sealing of said flow apertures when said sealing member bottom surface abuts a top surface of said stem member; and

a spring element disposed within said base fluid channel;

wherein a portion of said spring element abuts said lower surface to apply a biasing force to said stem member.

44. A valve assembly for delivering a fluid from a fluid bag to an animal caging system for housing an animal, the valve assembly comprising:

an upper member having a piercing member and a connecting member, said upper member having a fluid channel defined therethrough;

a base having a base fluid channel defined therethrough, wherein said base is designed to be matingly coupled to said upper member;

a stem member designed and dimensioned to be disposed in part within said base fluid channel, said stem member having an actuation portion and having a top portion having a lower surface; and

a spring element disposed within said base fluid channel;

wherein a portion of said spring element abuts said lower surface to apply a biasing force to said stem member, and said spring element comprises at least one group of dead coils, thereby facilitating prevention of a tangling of a plurality of spring members when said spring members are arranged during the assembly process.

45. The valve assembly of claim 44, wherein said spring element comprises three groups of dead coils, one of said groups being located at the center of said spring element, one of said groups being located at a first end of said spring element, and one of said groups being located at a second end of said spring element.

46. A valve assembly of claim 45, further comprising:

a sealing member integrally formed with said upper member and disposed in said base fluid channel, said sealing member having a flow aperture and a sealing member bottom surface, said sealing member being designed and dimensioned to facilitate sealing of said flow apertures when said sealing member bottom surface abuts a top surface of said stem member.

47. The valve assembly of claim 46, wherein said sealing member bottom surface comprises a lower ridge extending therefrom, said lower ridge being designed and dimensioned to facilitate the concentration of said biasing force from said spring member to seal said flow aperture.

48. The valve assembly of claim 44, wherein said stem member is designed and dimensioned to selectively facilitate the flow of the fluid when said actuation portion is pushed.

49. The valve assembly of claim 44, wherein said stem member is designed and dimensioned to selectively facilitate the flow of the fluid when said actuation portion is pushed with a force of less than or equal to 5 grams.

50. The valve assembly of claim 44, wherein said stem member is designed and dimensioned to selectively facilitate the flow of the fluid when said actuation portion is pushed with a force of less than or equal to 3 grams.

51. A method of assembling a valve assembly for delivering a fluid from a fluid bag to an animal caging system for housing an animal, the method comprising:

coupling an upper member having a piercing member to a base having a base fluid channel defined therethrough;

disposing a stem member in part within said base fluid channel, said stem member having an actuation portion and a top portion having a lower surface;

disposing a sealing member in said base fluid channel, said sealing member having a flow aperture and a sealing member bottom surface, said sealing member being designed and dimensioned to facilitate sealing of said flow apertures when said sealing member bottom surface abuts a top surface of said stem member.

disposing a spring element within said base fluid channel, wherein a portion of said spring element abuts said lower surface to apply a biasing force to said stem member, and wherein said spring element comprises at least one group of dead coils, thereby facilitating prevention of a tangling of a plurality of spring members when said spring members are arranged during the assembly process.

52. The method of claim 51, wherein said spring element comprises three groups of dead coils, one of said groups being located at the center of said spring element, one of said groups being located at a first end of said spring element, and one of said groups being located at a second end of said spring element.

53. The method of claim 51 wherein said sealing member bottom surface has a lower ridge extending therefrom, said lower ridge being designed and dimensioned to facilitate the concentration of said biasing force from said spring member to seal said flow aperture.

54. The method of claim 51, wherein said stem member is designed and dimensioned to selectively facilitate the flow of the fluid when said actuation portion is pushed.

55. The method of claim 51, wherein said stem member is designed and dimensioned to selectively facilitate the flow of the fluid when said actuation portion is pushed with a force of less than or equal to 5 grams.

56. The method of claim 51, wherein said stem member is designed and dimensioned to selectively facilitate the flow of the fluid when said actuation portion is pushed with a force of less than or equal to 3 grams.